United States Patent [19]

Schiemann

[11] **Patent Number: 4,730,747**

[45] **Date of Patent: Mar. 15, 1988**

[54] **SCREW STOPPER FOR SYNTHETIC PLASTICS MATERIAL CANS**

[76] Inventor: **Wolfram Schiemann,** Eugen-Nagele-Str. 17, 7140 Ludwigsburg, Fed. Rep. of Germany

[21] Appl. No.: **17,540**

[22] Filed: **Feb. 24, 1987**

[51] **Int. Cl.**[4] **B65D 41/04**

[52] **U.S. Cl.** **220/288;** 220/264; 220/263

[58] **Field of Search** 220/288, 263, 264, 318; 222/469

[56] **References Cited**

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Primary Examiner—George T. Hall

[57] **ABSTRACT**

A screw stopper for synthetic plastic cans in the range of 10 litres and above has a pouring spout with an external threading, a cap with an internal threading fitting the external threading on the pouring spout, and a connection device between the pouring spout and the cap. The external and internal threadings have an equal pitch, that is high enough that rotation of the cap through 180 degrees plus/minus 30 degrees rotates the cap from a closed to an open position. An articulated handle on the upper side of the cap protrudes far beyond the cap. The connection device includes a retaining ring that guides the cap in a shape-engaging manner and a guide device that is rigidly connected with the pouring spout and guides the retaining ring and has a partial region arranged as an arrestor for the handle grip in the closed position of the cap.

23 Claims, 19 Drawing Figures

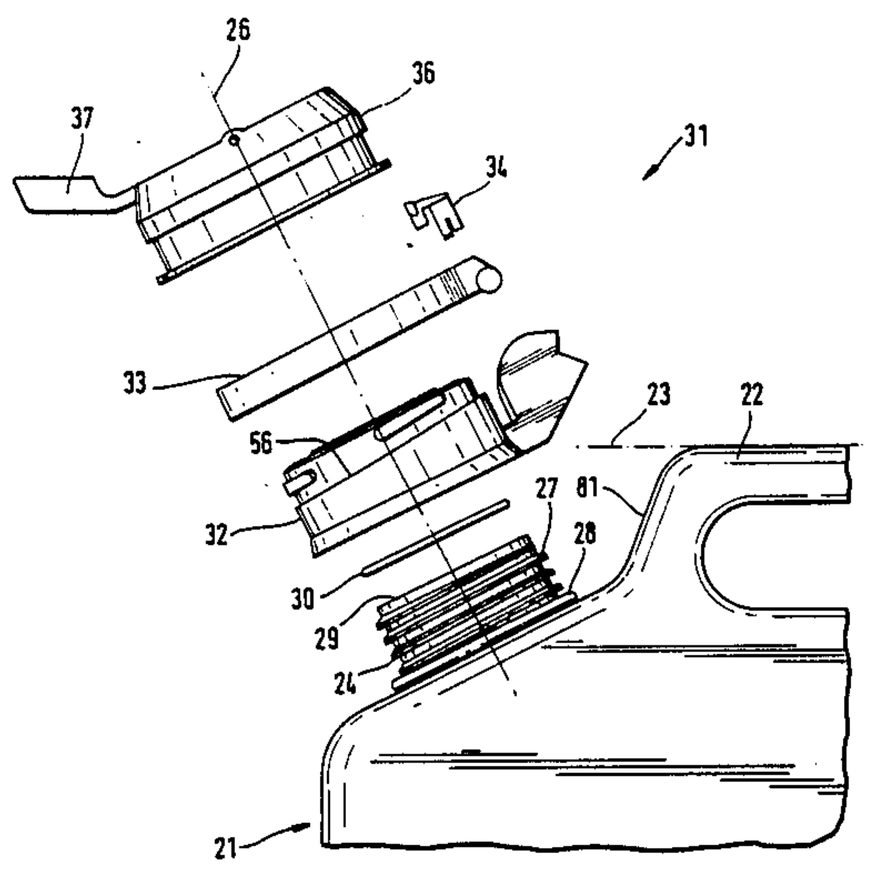
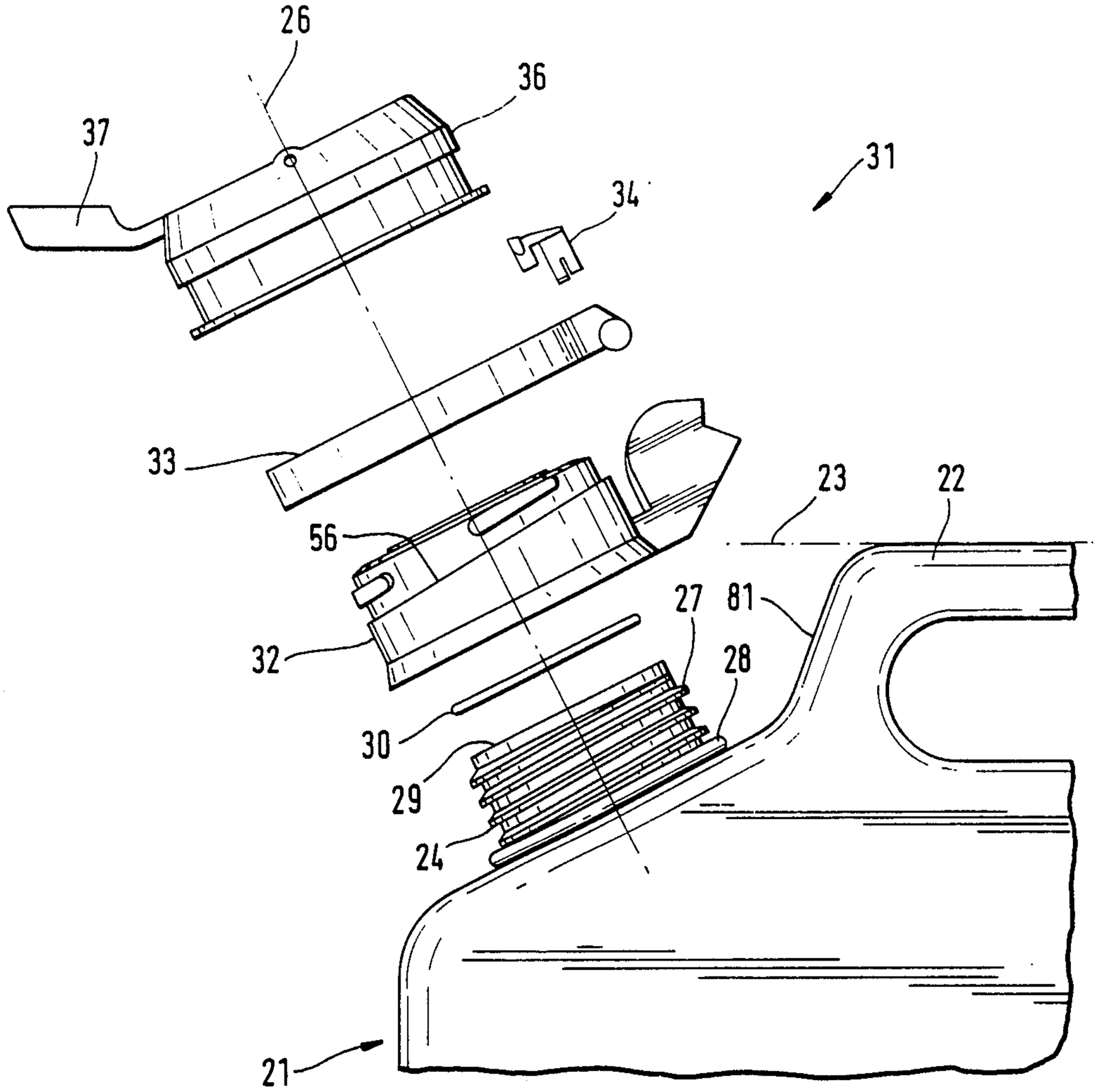
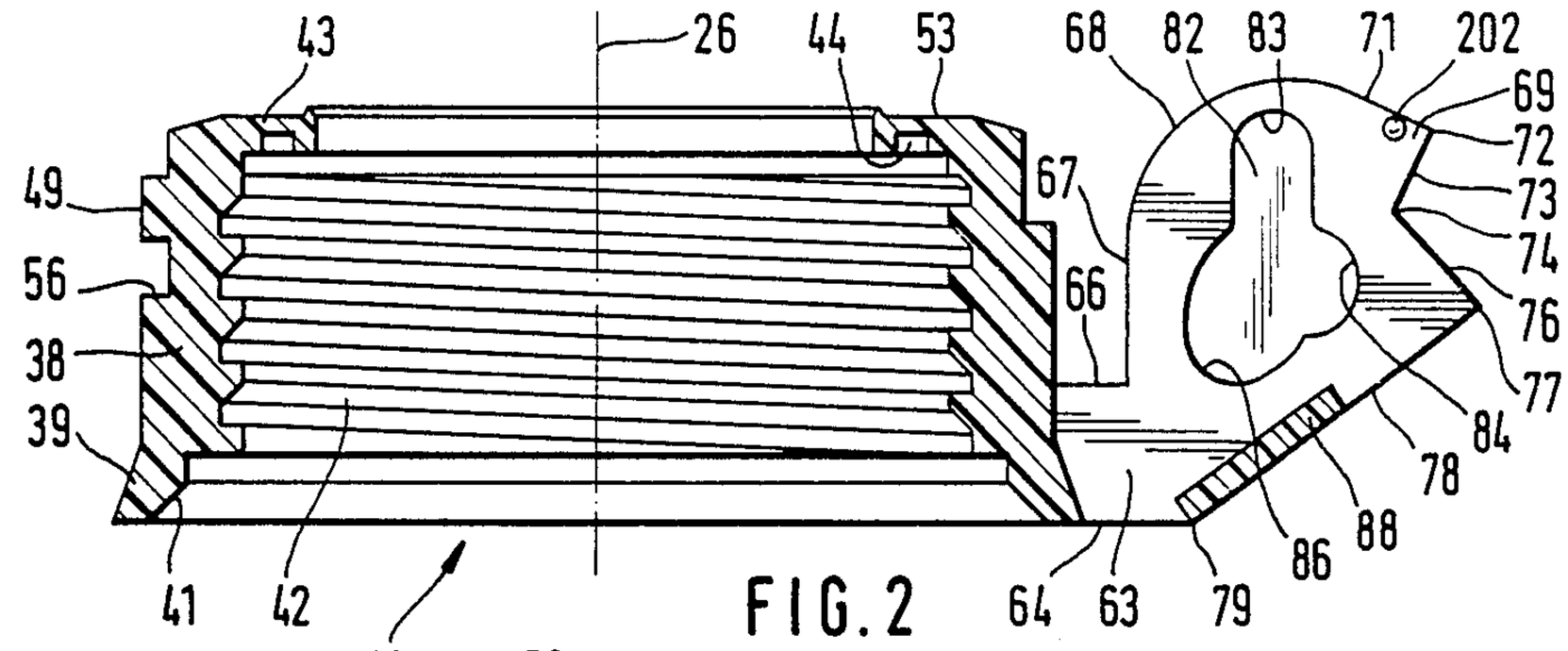


FIG. 1





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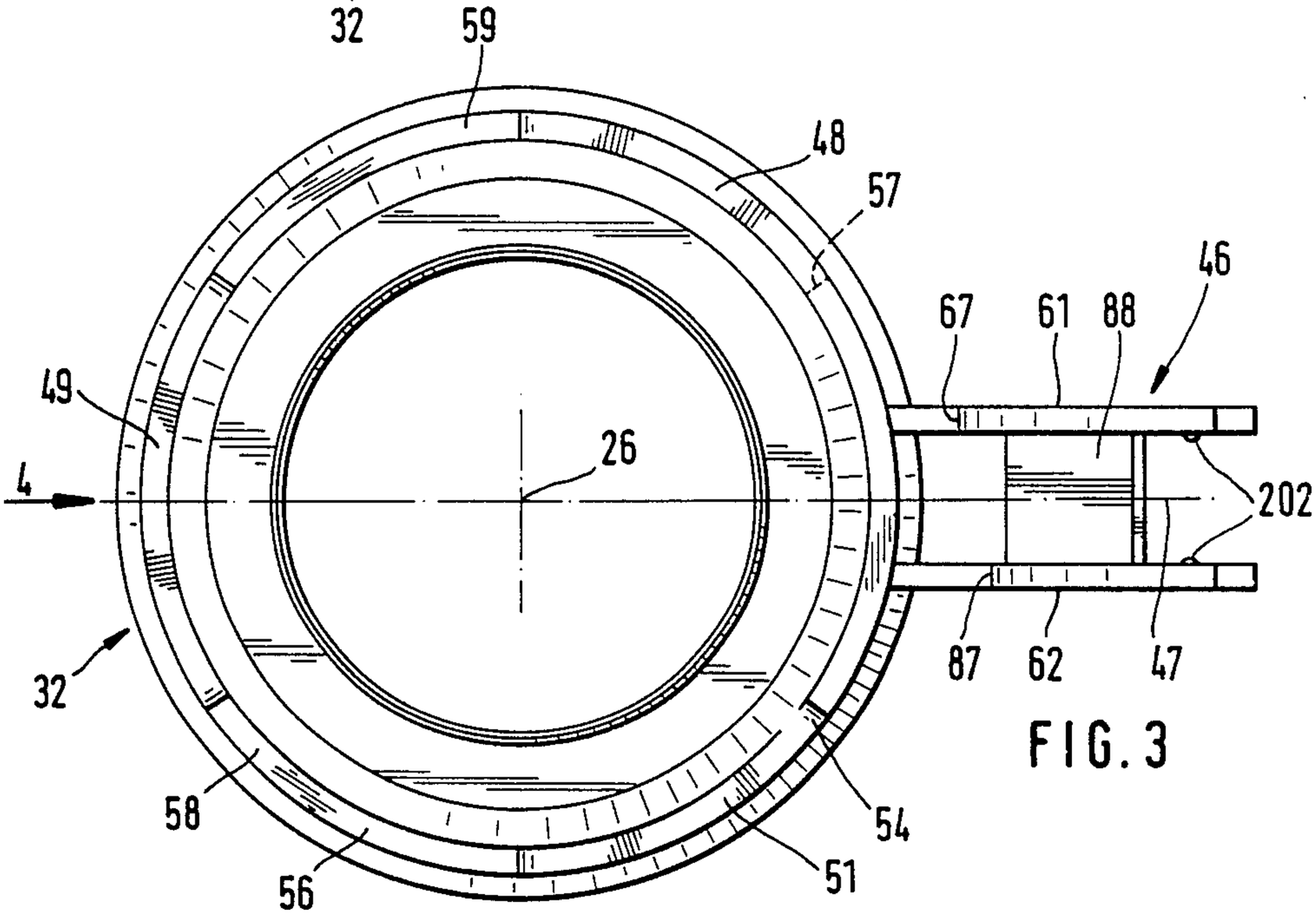

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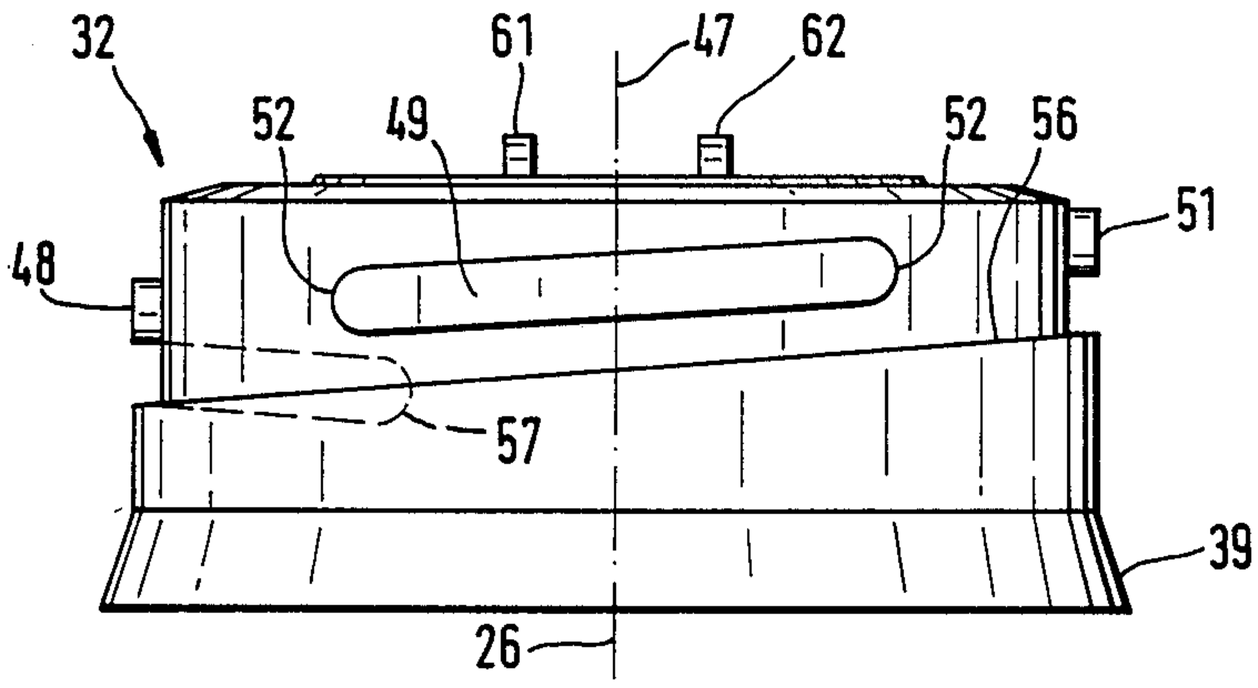

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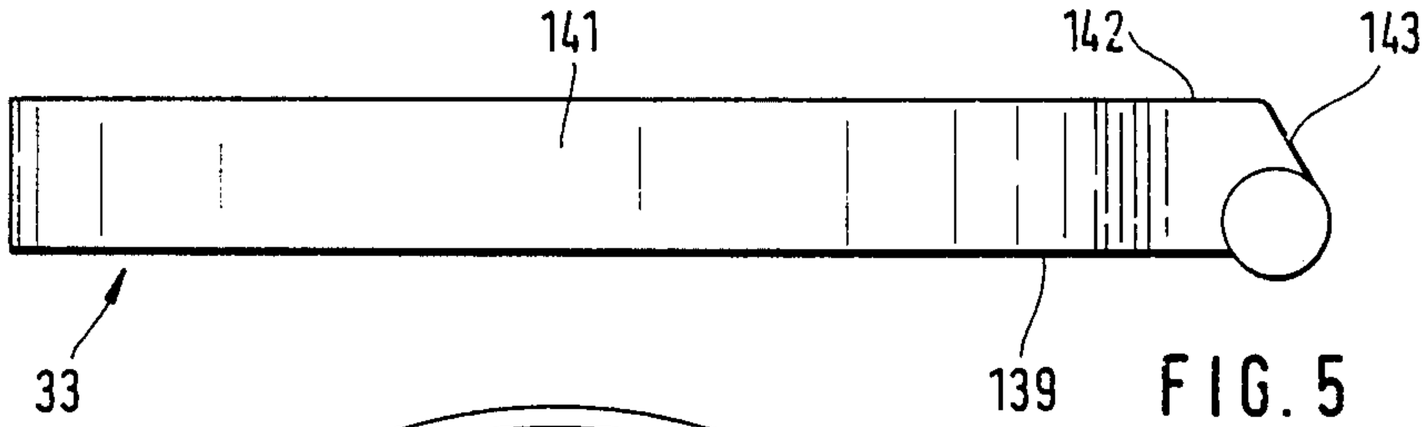

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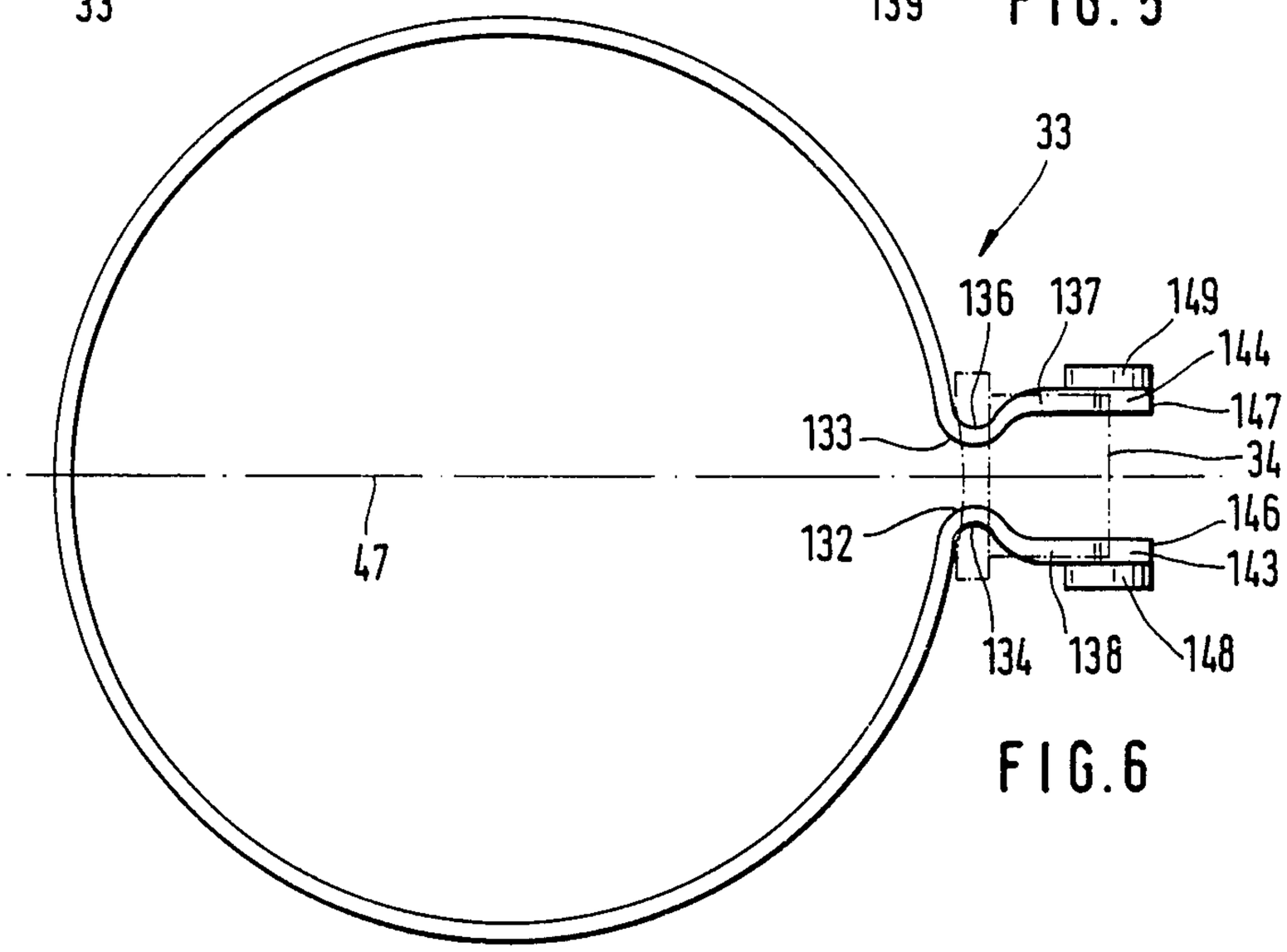

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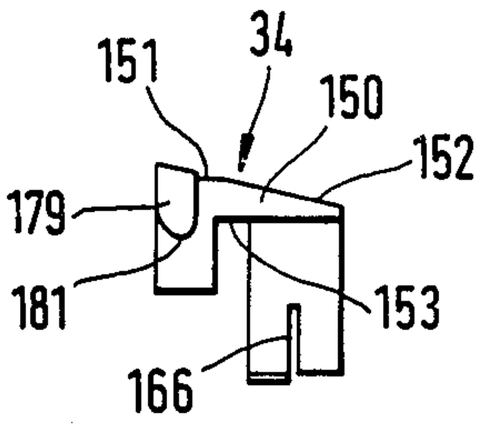

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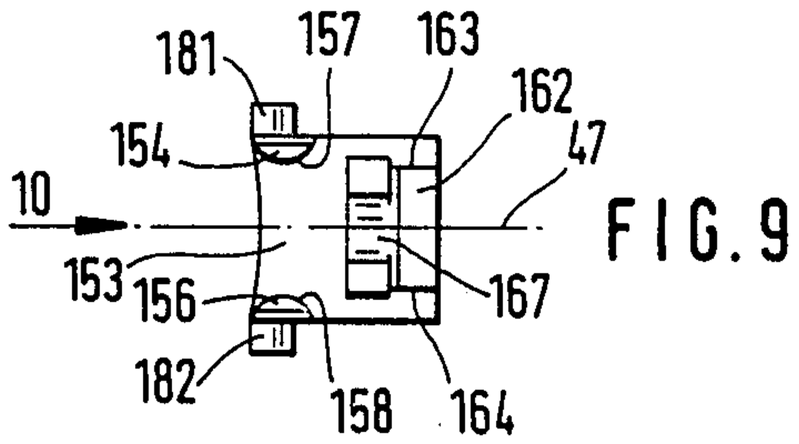

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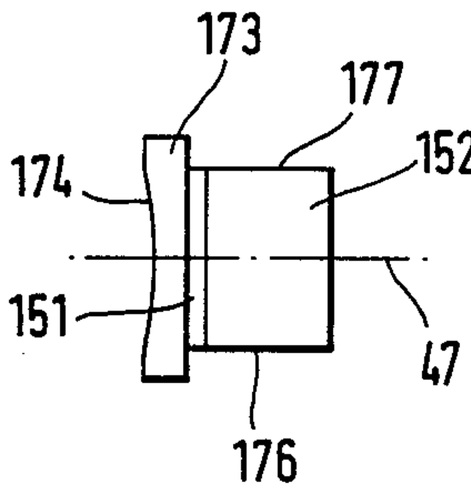

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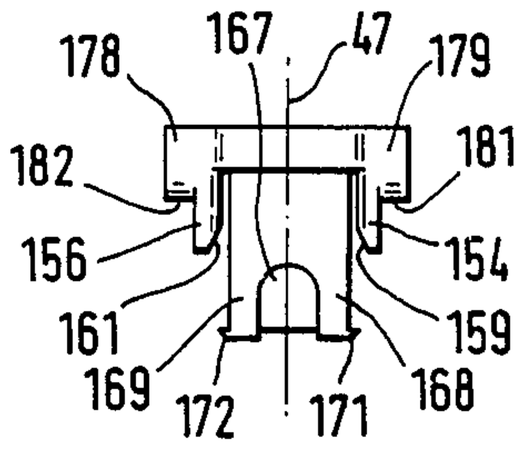

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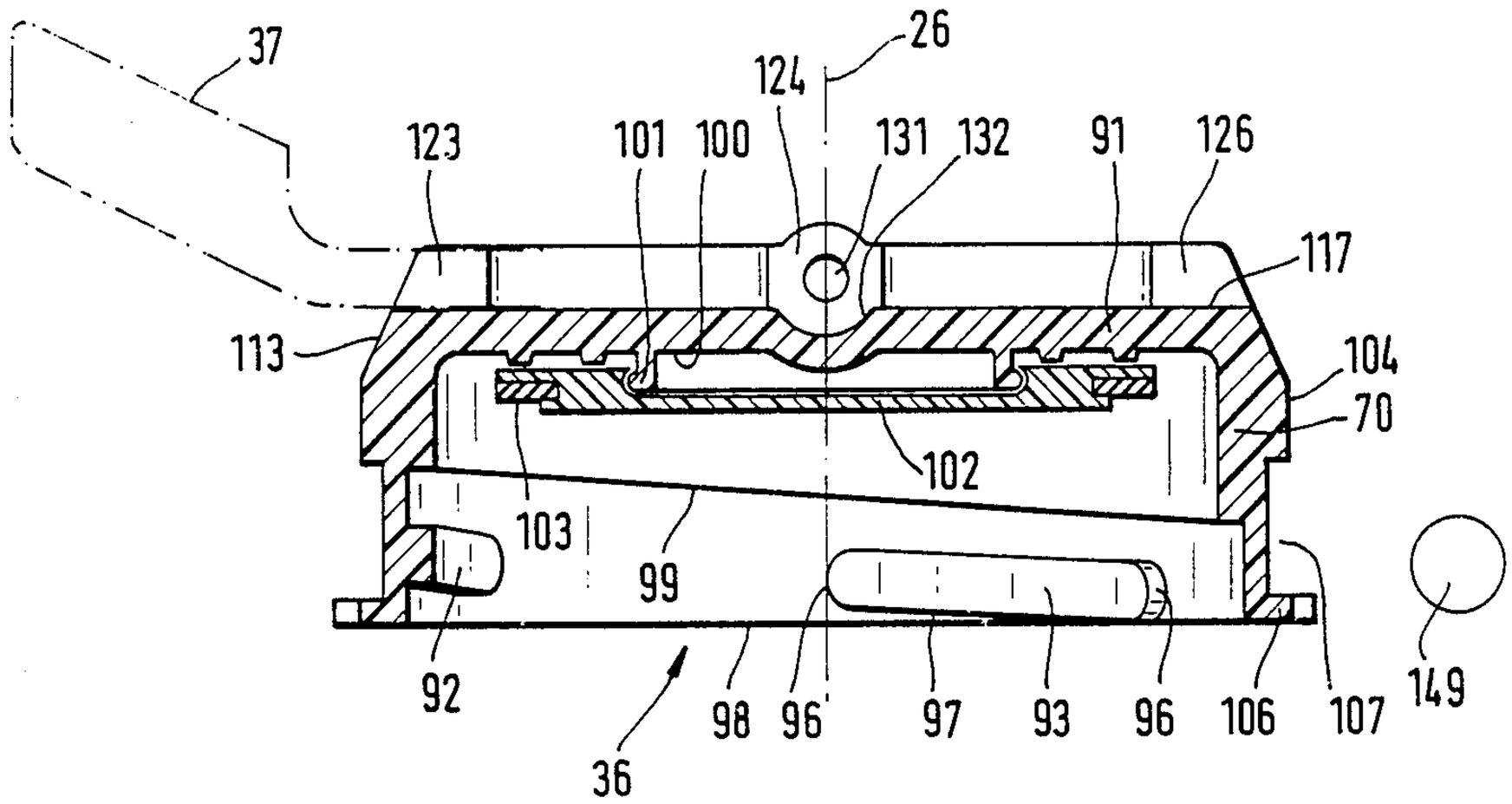
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FIG. 11

FIG. 12

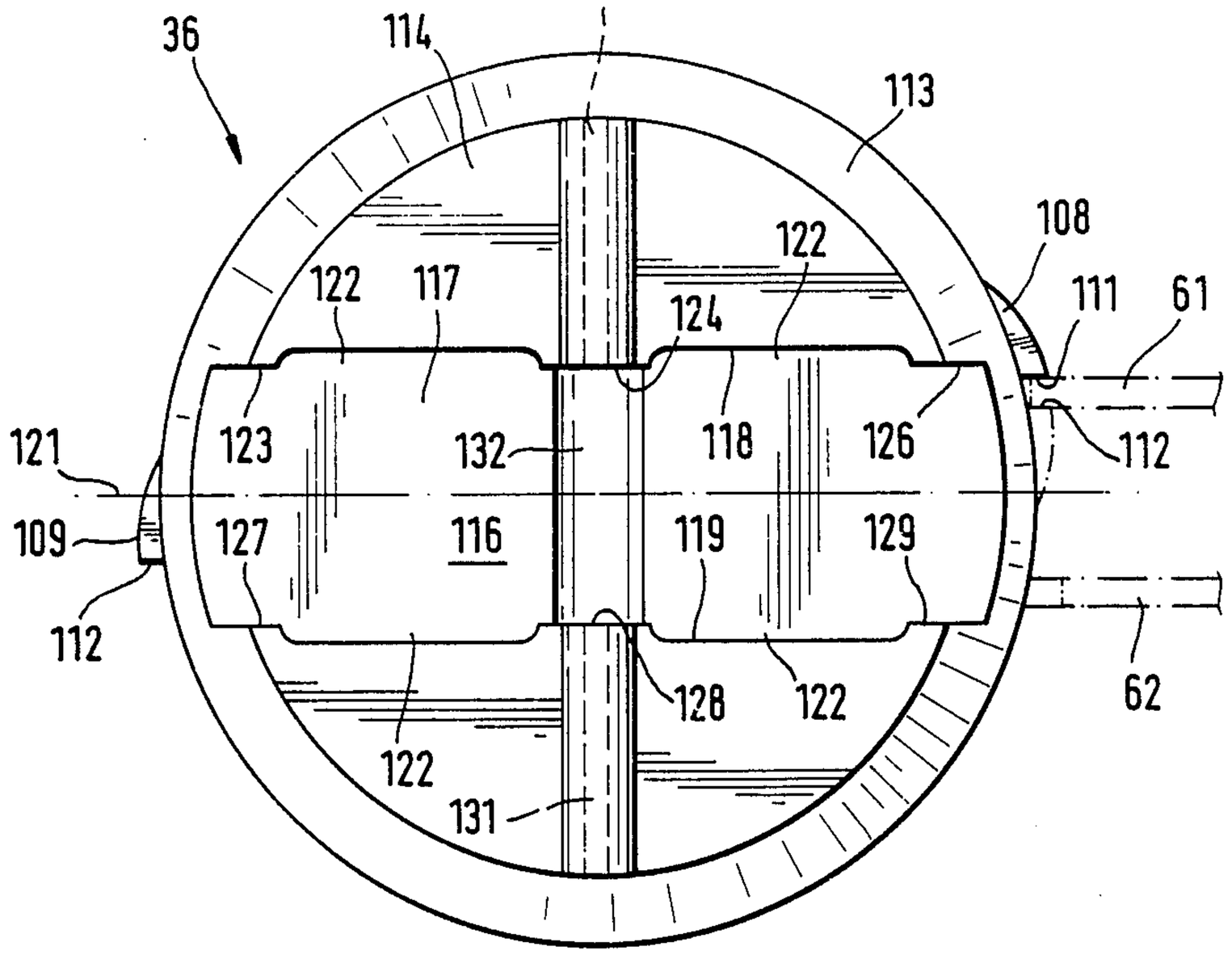
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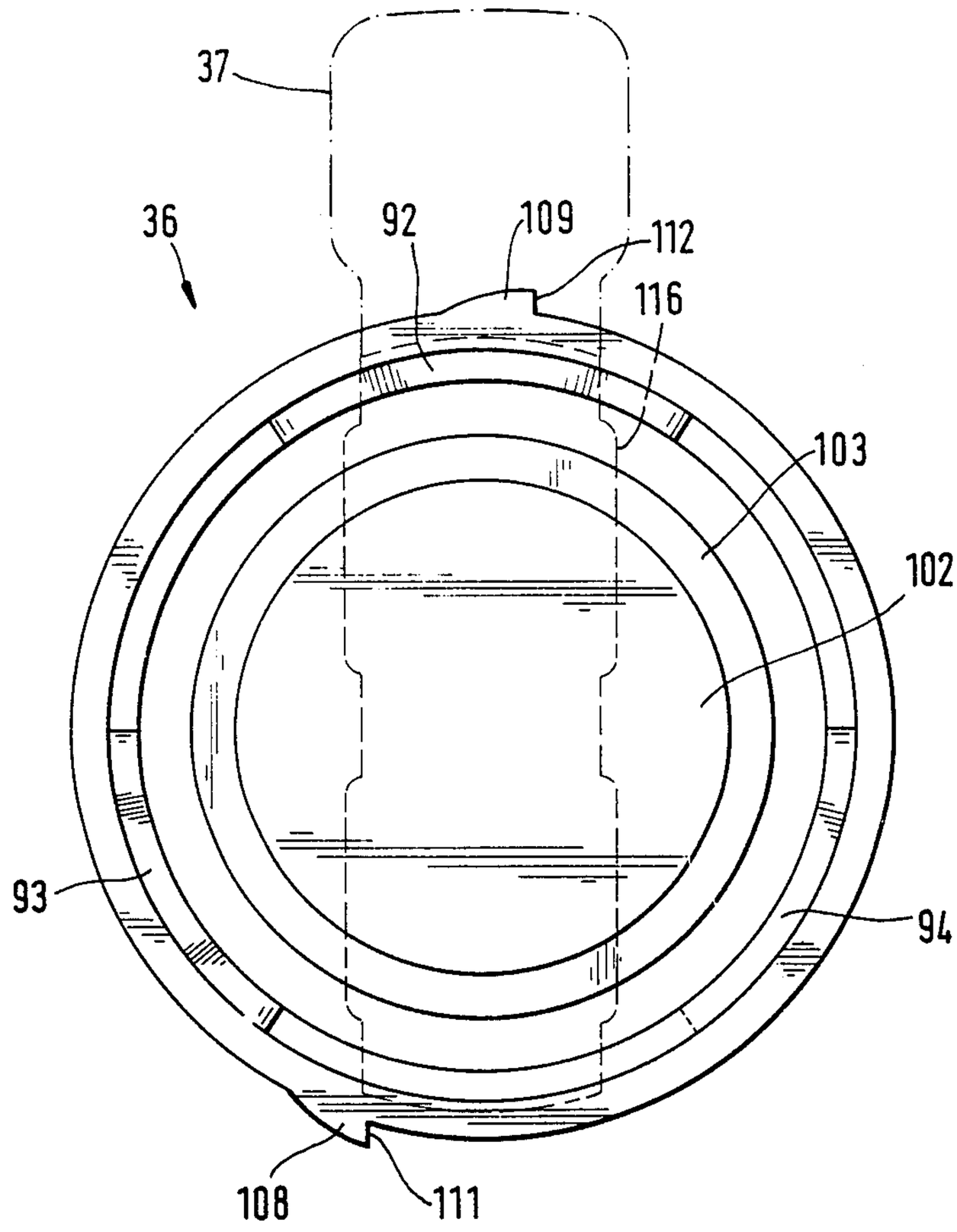
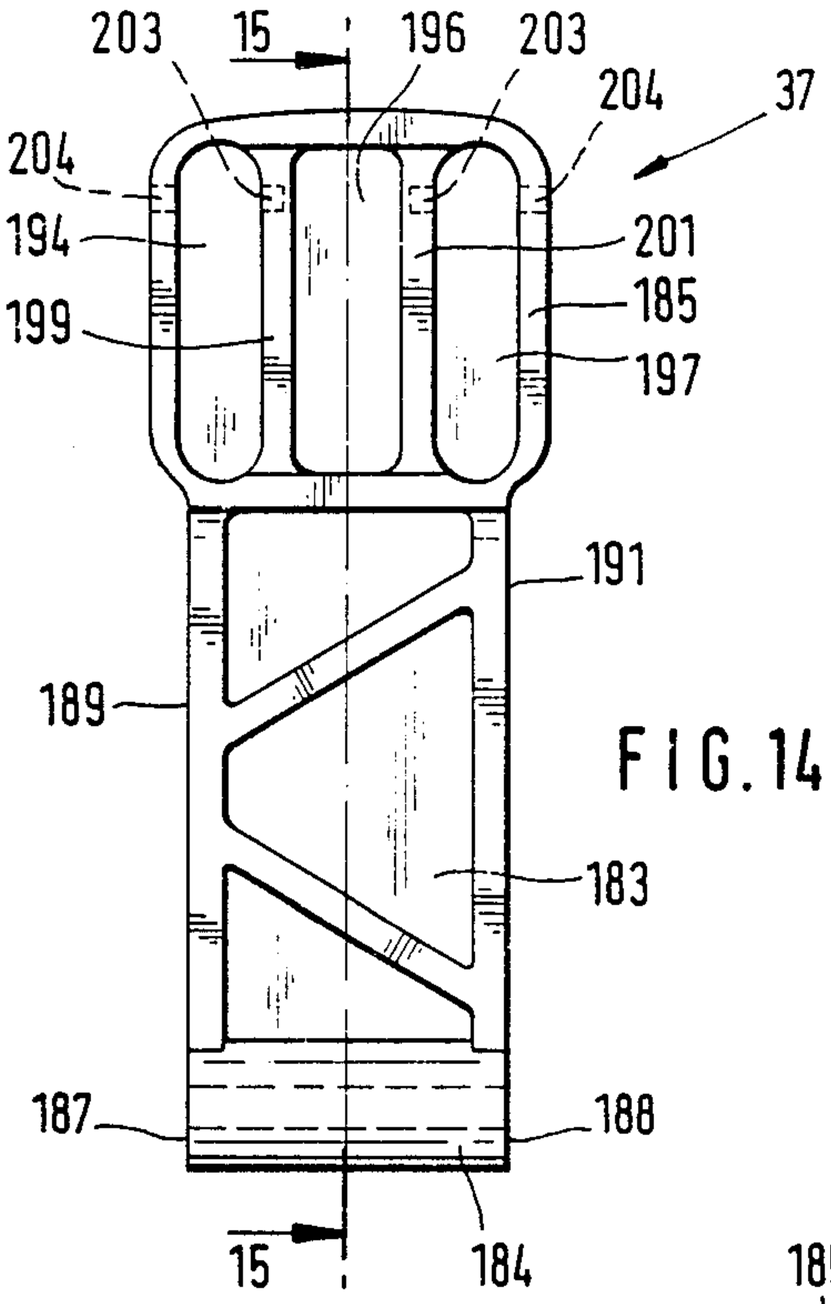
FIG. 13





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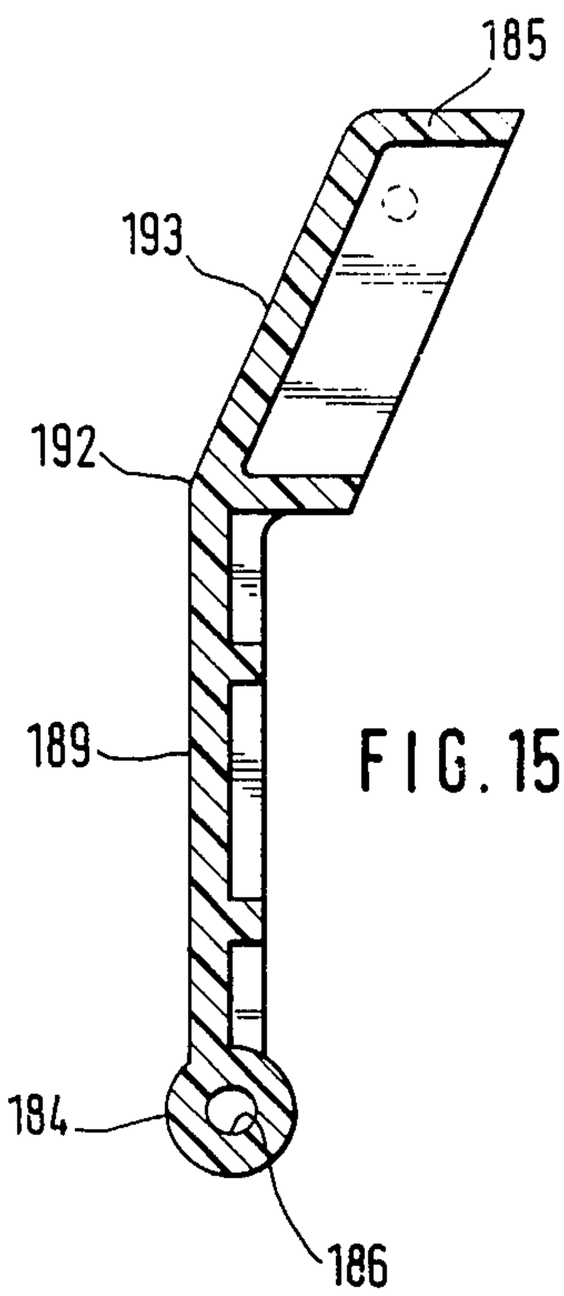

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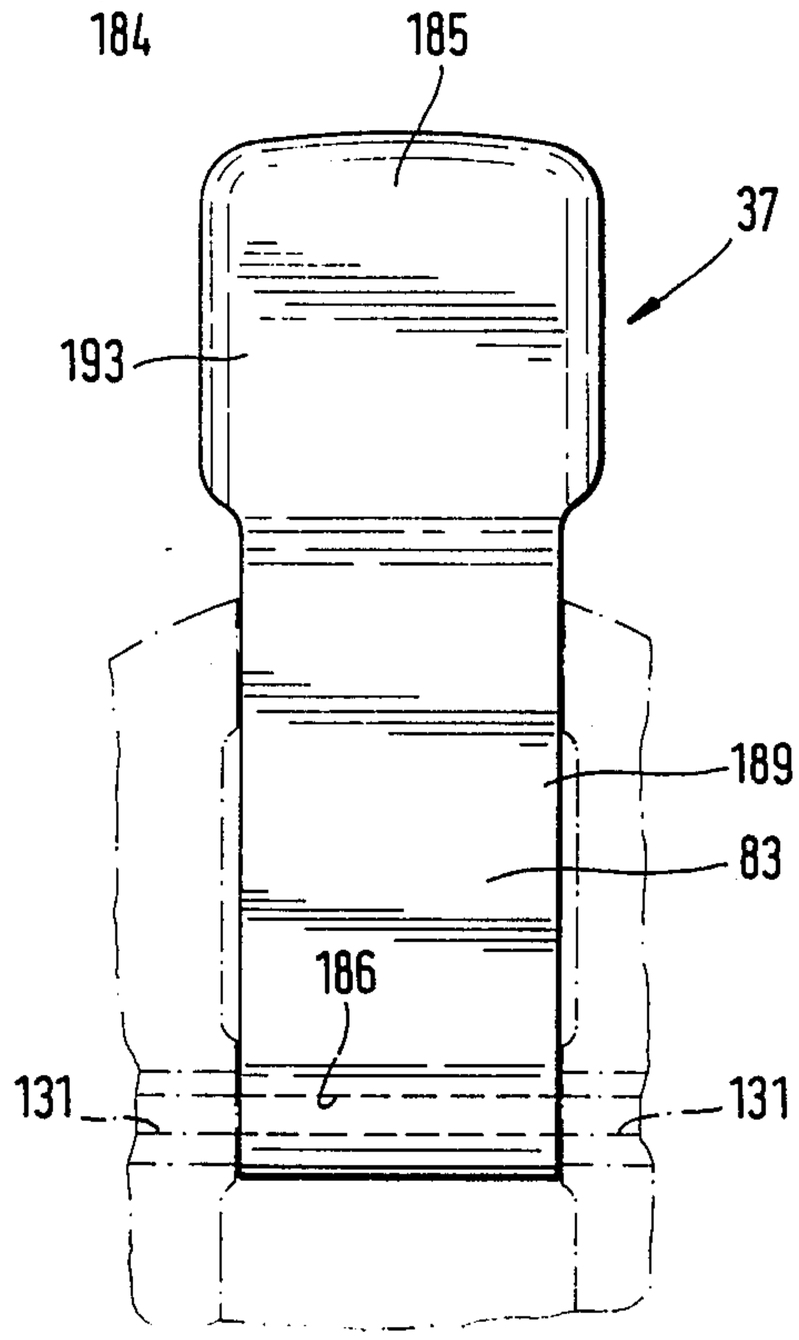

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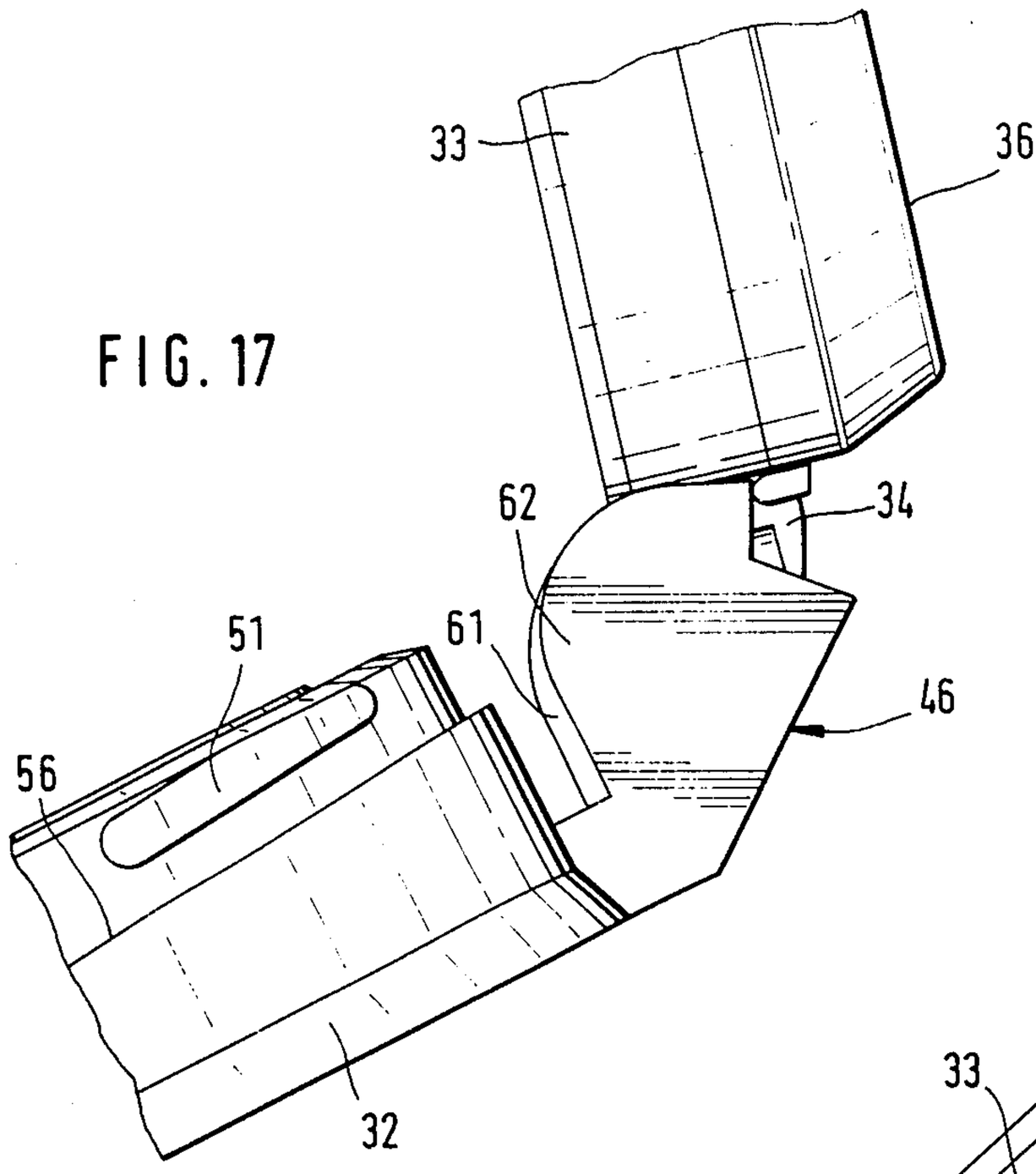

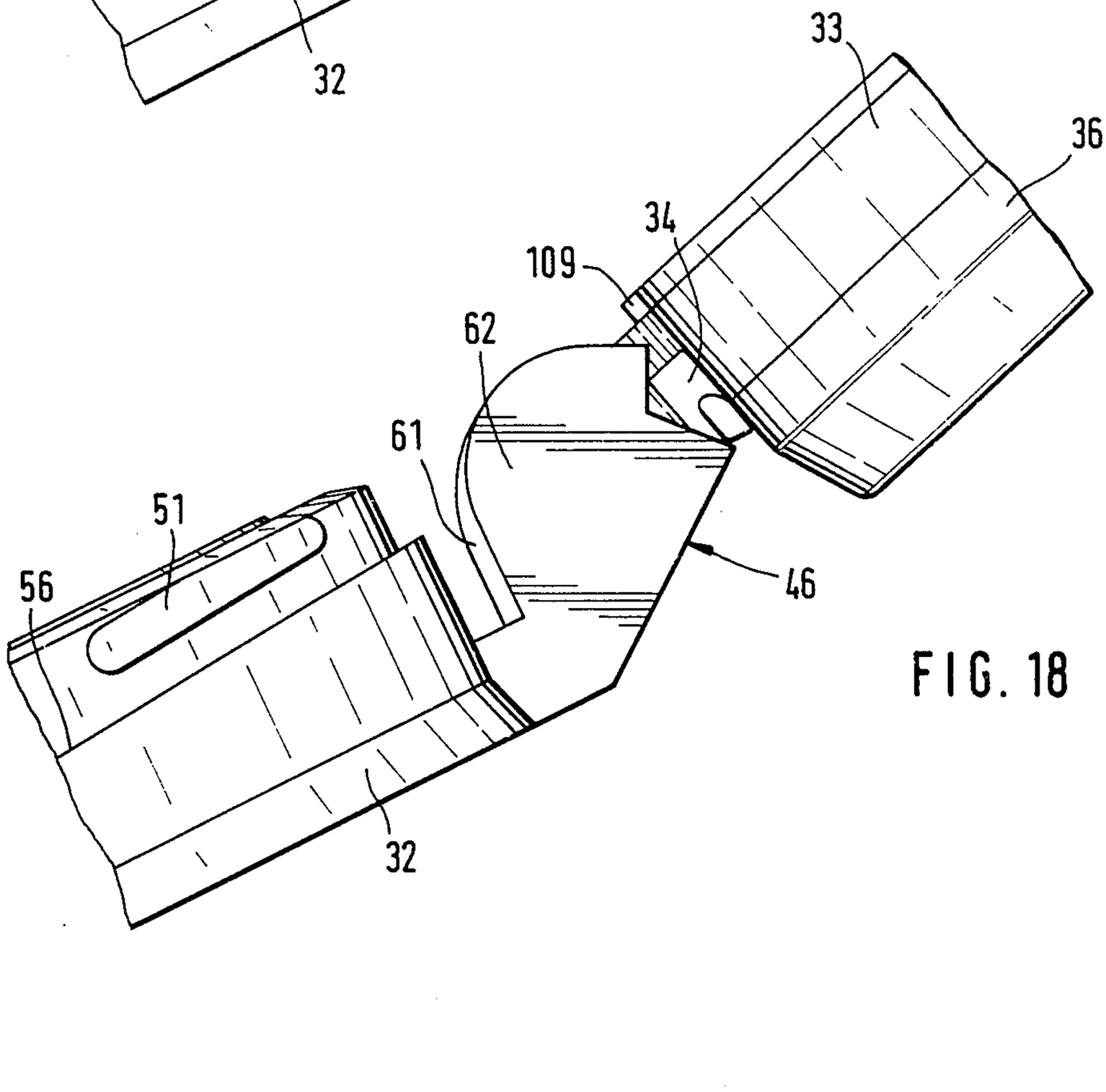

FIG. 18

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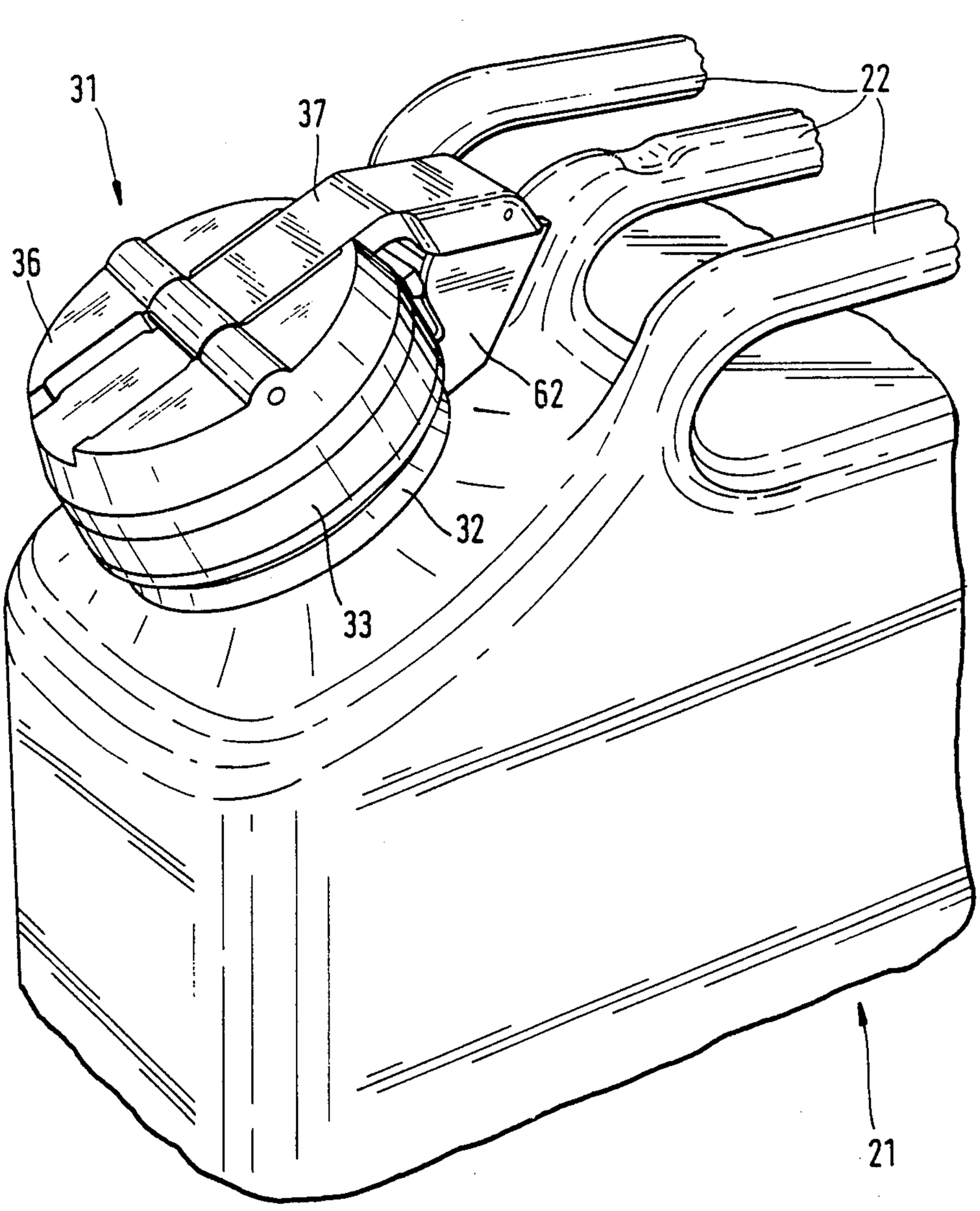

SCREW STOPPER FOR SYNTHETIC PLASTICS MATERIAL CANS

The invention relates to a screw stopper, and more particularly, a screw stopper for synthetic plastic cans in the range of 10 liters and above.

Such screw stoppers have a pouring spout which is rigidly connected with the synthetic plastic can. The pouring spout has a geometric longitudinal axis, an external threading, and an end face with annular seal thereon.

The pouring spout also has a cap, which is rotatable between a closed position and an open position. The cap has an external circumference and an internal threading fitting the external threading on the pouring spout.

A projecting device projects from the external circumference of the cap for manual transmission of a torque, and a connection device is provided between the pouring spout and the cap, which makes the cap non-loseable and permits rotation of the cap in relation to the pouring spout.

Screw stoppers of this kind must satisfy very strict conditions. With the can filled they must be capable of falling with the stopper foremost on to hard ground, without the stopper then leaking. This applies to heights of 1.80 meters and at temperatures reaching from −30 degrees C. to +60 degrees C.

Furthermore, the opening and closing mechanism must be such that everyone understands it without instruction, even for example at night, without having to look exactly, or even when rational thinking is absent, as for example, in panic situations.

The known claw-type stoppers have the advantage that it is clearly visible even for the laymen when the can is closed and when it is open. However, whenever these claw-type stoppers have been used together with can of synthetic plastic material, reinforcing constructions of metal have always been necessary which through special design features have introduced the forces acting upon the pouring spout into the synthetic plastics material can.

Screw stoppers are cheaper than the claw-type stoppers. However, these have a series of disadvantages:

(a) With them, one neither sees or can feel, in poor visibility, whether the can is closed. Even with great technical understanding one cannot see whether the stopper has been tightened with the necessary moment.

(b) Both in tightening and in opening one must change one's hand grip about six times before one has reached the open or the closed condition. This is fatiguing and also takes much too long in emergency situations. In this connection it is not to be presumed that only one single can is to be opened or closed. Rather sometimes whole lorry-loads have to be emptied and refilled.

(c) So that the necessary closing moment may be achieved even with weak hands, the pitch of the threading must be relatively small. This signifies rather a fine threading than a course threading, which makes the tool dearer.

(d) In the case of a threading tending more towards the fine, the root area of the thread turn is relatively small, so that the thread turn can flow away, as is typical for blow-moulded synthetic plastics materials.

(e) The cap hangs on a kind of synthetic plastics strap. The synthetic plastics strap must be relatively long so that the cap can reliably come out of the poured jet. The

substantially better positioning of the pouring cap, to which one is accustomed for example from claw-type stoppers, cannot be achieved thus. Thus the cap swings to and fro.

(f) The synthetic plastics strap also hinders the turning of the cap, for one can turn only as far as the synthetic plastics strap and then the hand must be moved back.

(g) The synthetic plastics strap is secured rotatably centrally on the top of the cap. In rotation of the synthetic plastics cap this region of the connection device seeks to accompany the rotation. In fact two hands are needed: with the one one rotates the synthetic plastics cap and with the other one holds back the connection device. However the second hand would be required here to hold the can fast.

(h) So that the cap can swing out of the way in the opened condition, the synthetic plastics strap must be relatively thin. Therefore it frequently also breaks off and the cap is then only theoretically non-losable.

(i) On account of the long turning distance of the cap the press-on sealing plate, always present on the inside, chafes causing abrasion.

(j) Since relatively many thread turns are necessary, the invariably present spout integral with the synthetic plastics can must be relatively long. If the spout is long the entire stopper is of high formation, and if the stopper is high, then in the case of stackable synthetic plastics cans it comes above the stacking level, so that the synthetic plastics cans no longer stand one upon the other correctly.

(k) Since the spout integral with the can must be relatively long one is compelled to cause it to extend more perpendicularly than would be desirable for convenient pouring, so that the screw cap does not extend into the stacking plane.

It is the problem of the invention to indicate a screw stopper which avoids the above-stated disadvantages as a whole but is in fact practible under the conditions of use such as can occur in the worst case, even in emergencies.

In accordance with the invention, this problem is solved by the following features:

(a) The external threading on the pouring spout is provided in three or more sectors in relation to the geometrical longitudinal axis of the spouring spout.

(b) The internal threading on the cap is provided in three or more sectors in relation to the geometrical longitudinal axis of the pouring spout, with the internal threading sectors fitting in circumferential angle into the external threading sectors on the pouring spout and vice versa.

(c) The internal and external threadings have equal pitch, which pitch is high enough that rotation of the cap through 180 degrees plus/minus 30 degrees rotates the cap from its closed position to its open position and vice versa.

(d) The cap has an upper side, and the projecting device comprises a handle on the upper side of the cap, which is provided with a handle grip that protrudes far beyond the external circumference of the cap and a handle web with an end region pivotably articulated with the cap.

(e) The connection device includes a retaining ring which guides the cap in a shape-engaging manner and a guide device that is rigidly connected with the pouring spout and guides the retaining ring substantially non-

rotatably in relation to the geometrical longitudinal axis of the pouring spout.

(f) The guide device has a partial region arranged as an arrestor for the handle grip in the closed position of the cap.

Thus the following advantages are combined:

(a) The pitch of the threading can be large and nevertheless the cap does not open itself.

(b) The thread root can be extraordinarily wide.

(c) Production can be simple since continuing thread turns do not have to be produced.

(d) One sees immediately whether the cap is open or shut, for there are only two extraordinary and also easily recognizable positions of the cap. The one position cannot be confused with the other.

(e) The handle considerably increases the applicable moment, even beyond what is ordinarily applied for the transmission of the torque, namely a roughly radial structure.

(f) Closing and opening proceed just as quickly as with the known claw-type stopper.

(g) When the handle grip is arrested, the cap is closed, namely neither with too much force, which would cause overstressing, nor with too little force which would cause leakage.

Advantageously, the invention includes the following additional features:

Three sectors of the external threading and the internal threading are provided. Rotation of the cap through **180** degrees rotates the cap between the closed and open positions.

By these features, one achieves a minimum number of sectors together with an easily visible or even feelable position of the cap.

The sectors of the external threading are of equal length and arranged at angularly regular intervals. By this feature, the production is simplified and the engagement lengths of the sectors remain uniformly observable.

The sectors are longer than 45 degrees and shorter than **60** degrees. By this feature, one obtains sectors which are long but not too long, which guide the cap wall on its short rotation distance.

The can has a spout extension integral with the can, and the external threading is part of an annular, injection-molded body which firmly and rigidly-abuttingly girdles the spout extension. By these features, one can apply the invention even to those synthetic plastics material cans in the production of which the synthetic plastics material is subjected only to low pressures, as for example, the centrifugal casting process, blow-molding, etc. In these cans the spout extension is comparatively soft, while the injection-molded body can be nearly as hard as light metal. Moreover, this reduces the weight of the synthetic plastics can, the great advantage of which is per se its low weight compared with a sheet metal can, which would be partialy increased by a metallic body. This is important especially for cans which are transported as air freight. Moreover, an injection-molded body can be produced with more precise dimensions than would be the case with other methods.

The cap and the connection device are injection-molded from synthetic plastic. Logically, the same advantages as described above arise from this feature.

The handle web has a width of at least one-fifth of the external diameter of the cap. Due to this feature, the lateral bending of the handle web can be neglected and the forces can be introduced into the cap at mutually relatively remote points.

The handle web has a width 3.5 plus/minus 15% smaller than the external diameter of the cap. Due to this feature, the handle web is not too large and has an optimum value in relation to the size of the cap.

The handle web is flat in relation to its width. Due to this feature, the handle web is inconspicuous in height.

The cap has a transverse axis and the handle web has a free end zone that is pivotable through 180 degrees about the transverse axis. Due to these features, the optimum lever arm is obtained in the two end positions.

Perpendicularly of the transverse axis, the upper side of the cap has a shallow groove that accommodates the handle web in width and height. Due to this feature, the handle web remains protected.

The handle web has side faces and the groove has side walls, and, at least in partial zones, the side faces of the handle web rest on the side walls of the groove. Due to these features, the forces occurring in closing and opening are introduced not only in the region of the transverse axis but also in these partial zones which can lie relatively far outwards, so that favorable force conditions occur.

The can has carrying handles with upper sides and the handle grip has an upper side that, in a closed condition, lies at the level of the upper sides of the carrying handles and is angled in relation to the handle web. Due to these features, further standing area can be gained in stacking. Moreover, an article lying thereabove, for example a further can, additionally secures the handle grip in the arresting direction.

The handle grip has a hollow portion on its under side, which engages the partial region of the guide device. Due to this feature, material is saved, the handle grip can be made relatively large without the occurrence of material retractions and the hollow regions can be used at the same time for position fixing in rotation.

The partial region of the guide device is also a security means against rotation for the handle grip. Due to this feature, the cap can no longer open of its own accord, despite the fact that the pitch of the threading is relatively high.

The guide device has webs, and when the handle grip is arrested by the guide device, it sits against the webs. Due to these features, the forces acting upon the handle grip, for example in stacking, can be introduced in a simple way into the pouring spout.

The retaining ring has a shank zone, and the guide device comprises two mutually parallel, mutually spaced, walls parallel to the geometrical longitudinal axis of the pouring spout, the walls having interior machined depressions that guide the shank zone between them. Due to these features, a protected guidance is obtained, namely for the cap rising and descending in opening and closing, for the pivoting of the cap and also for the holding of the cap in the open position, in which, as is known, it must not drop into the pouring jet.

The shank zone comprises two lugs bent out of the retaining ring and guided on the parallel walls of the guide device. By this feature, one obtains a one-piece junction, which can well be injection-molded, between the retaining ring and the guide device.

A distance piece is provided which provides a spacing member for the lugs and grasps around the lus. Due to this feature, the inherently thin lugs become easily connectable with one another, the retaining ring can

easily be fitted by slight bending open, and also the lugs then cannot be pressed together.

The retaining ring has a flat profile in cross-section and is circular-cylindrical, and the external circumference of the cap has a matching groove in which the retaining ring is guided. Due to these features, a wide guide surface and a rigid retaining ring are obtained, which retaining ring can take up high forces and retain its shape even if overloading occurs.

On the external circumference of the cap, at least one projection is provided which abuts the guide device in the closed position and/or the open position. Due to this feature, the cap cannot be turned beyond its two illustrated positions.

The projection is provided beneath the retaining ring. By this feature, the object is achieved that the projection is in a position where it causes no interference, and moreover, there it comes early into the region of the guide device, which would not be the case if it were to lie, for example, above the retaining ring.

DESCRIPTION OF THE DRAWINGS

A preferred example of embodiment of the invention will be described below.

FIG. **1** shows an exploded illustration of the screw stopper with the upper left region of the can,

FIG. **2** shows a radial section through the pouring spout.

FIG. **3** shows the plan view of FIG. **2**,

FIG. **4** shows a view in the direction of the arrow **4** in FIG. **3**, FIGS. **2–4** being on the scale 1:1,

FIG. **5** shows the lateral view of the retaining ring,

FIG. **6** shows the plan view of FIG. **5**, on the scale 1:1,

FIG. **7** shows the lateral view of the distance piece on the scale 1:1,

FIG. **8** shows the plan view of FIG. **7**,

FIG. **9** shows the view of FIG. **7** from beneath,

FIG. **10** shows the view in the direction of the arrow **10** in FIG. **9**,

FIG. **11** shows a radial section through the closure cap on the scale 1:1,

FIG. **12** shows the plan view of FIG. **11**,

FIG. **13** shows the view of FIG. **11** from beneath,

FIG. **14** shows the view of the handle from beneath on the scale 1:1,

FIG. **15** shows a section along the line **15—15** in FIG. **14**,

FIG. **16** shows the plan view of FIG. **14** with groove indicated,

FIG. **17** shows the lateral view in the region of the guide device, the cap being arrested in the opened condition so that it cannot fall into a pouring jet,

FIG. **18** shows a view of the region of FIG. **17**, but with cap fully hinged up and thus not arrested,

FIG. **19** shows a perspective view of the stopper in the closure position.

DETAILED DESCRIPTION

A 20-liter can **21** is blow-moulded from synthetic plastics material in the usual way. On its upper side it has three handles **22**, the upper sides **23** of which extend parallel with the bottom (not shown) of the can. To the lower left of the handles a spout extension **24** is provided integrally with the can **21** and is coaxial with a geometrical longitudinal axis **26** extending obliquely in the manner as illustrated. Externally the spout extension **24** carries a coarse external threading **27**. At the base of the external threading **27** an O-ring **28** is provided, which has sealing functions. On the end face **29** of the spout extension **24** there lies an O-ring **30** likewise having sealing functions.

A closure **31** comprises a pouring spout **32**, a retaining ring **33**, a distance piece **34**, a cap **36** and a handle **37**. Apart from the distance piece **34** and the handle **37**, these parts lie coaxially with the geometrical longitudinal axis **26**, namely when the closure **31** is closed, in the opening movement and also until the moment when the cap **36** is pivoted up.

The pouring spout **32** (FIGS. **2** to **4**) has a substantially cylindrical wall **38**. Downwards this merges into a small, widening cone frustum **39**. The inner slope **41** of the latter presses in wedge form upon the O-ring **28** and thus forms a first seal. The inner wall carries a coarse internal threading **42** which can be screwed on to the external threading **27**. At the top the wall **38** merges into a small, inwardly directed cover ring **43**, which has on the under side a ring groove **44** in which the O-ring **30** lies. The contributory dimensions are such that the inner slope **41** rests with the necessary force on the O-ring **28** precisely when the cover ring **43** presses the O-ring **30** with the correct force upon the end face **29**. Moreover then a guide device **46** (FIG. **3**), to be explained later, has a position in which it is symmetrical in relation to the central plane **47** of the **20-1**. can **21**. On the outside the wall **38** carries three sectors **48**, **49**, **51** which have a roughly rectangular profile and each have roundings **52** at their ends. Their rise amounts to 14 mm. As appears especially clearly from FIG. **4**, the sectors **48**, **49**, **51** are a single but interrupted thread turn, where the sector **51** begins with the upper side **53** of the cover ring **43** at **54**, then descends, continues later in the sector **49** lying at half height which then in turn continues with the lowest sector **48**. Calculating in the clockwise direction in FIG. **3** from the central plane **47**, the sector **51** begins at 35° and ends at 90°. The sector **49** begins at 145° and ends at 215° and the sector **48** begins at 270° and ends at 325°. The sector **48** does not actually end at 325°; rather its upper side continues with the spiral surface **56** visible in FIG. **4**, so that (FIG. **4**) beneath the sector **48** a recess occurs which has its end at **57**. Thus in the view in FIG. **3** an empty sector **58** results between the sector **51** and the sector **49**, and an empty sector **59** results between the sectors **49** and **48**.

No empty sector results between the chain line at **67** and the sector **51**, because thence the spiral surface **56** swings away and an empty sector is not necessary there for the function.

The guide device **46** includes two walls **61**, **62**. Regarding their arrangement, form and configuration reference is made expressly to FIGS. **2** to **4**, which are to scale. According to these the wall **61** comprises a part wall **63** standing horizontally to the right according to FIG. **2**, the lower edge **64** of which extends horizontally at the level of the lower edge of the cone frustum **39**. The upper horizontal edge **66** extends approximately at one third of the height of the pouring spout **32** and then merges into a vertical edge **67** which merges, approximately at the level of the spiral surface **56** there, into a quarter circle **68** pointing to the right. The quarter circle **68** is continued to the right in a spur **69** which has at the top an edge **71** inclined at 25° to the horizontal. Thereupon a sharp point **72** follows. The point **72** is followed by a straight edge **73** swinging away downwards to the left at about 60°, which after a corner **74** merges into a straight abutment edge **76**, which swings

away down to the right. The edge **72** is shorter than the stop edge **76**, as the drawing shows. After an 80° corner **77** there follows a straight lower edge **78** which has an angle of about 35° and merges with a corner **79** into the lower edge **64**. As also appears from FIG. **1**, the lower edge **79** has approximately the angle in relation to the geometrical longitudinal axis **26** which the plane **81** assumes the spout extension **24** towards the upper side **23**. However in the assembled condition a distance remains between the lower edge **78** and the plane **81**. From the inner side of the wall **61** a shallow milled recess **82**, not piercing the wall, is provided which according to the drawing comprises an upwardly extending round inlet **83**, a shorter but also wider round inlet **84** extending towards the 80° corner **77**, and a likewise shorter but wide round inlet **86** extending towards the partial wall **63**. The edges of these inlets have a considerable spacing from the outline of the wall **61**.

The wall **62** is in mirror image about the central plane **47**, with the one exception that according to FIG. **3** its vertical edge **87** is more remote from the pouring spout **32** than is the vertical edge **67**.

In the region of the lower edge **78** the two walls **61**, **62** are connected with one another by a flat stiffening crosspiece **88**. So that the pouring spout **32** cannot rotate on the spout extension **24**, a snap-locking device (not shown) is provided which acts in a manner in which an elevation provided at the bottom of the cone frustum **39** can snap into a corresponding depression of the plane **81**.

The cap **36** (FIGS. **11** to **13**) has a substantially circular-cylindrical wall **70** coaxial with the geometrical longitudinal axis **26**. This wall merges at the top into a cap top **91**. Where according to FIG. **3** the empty sectors **58**, **59** are situated and in the space between the sector **61** and the chain line at **57**, the wall **69** has on its inner side three sectors **92**, **93**, **94**, which extend inwards, are in angle somewhat shorter than the empty sectors **58**, **59**, have roundings **96** at the ends and can be interpreted as a single interrupted thread turn with a rise of **14** mm., which in the closed condition engages beneath the sectors **48**, **49**, **51**. The sector **93** merges with its under side **97** at the rounding **96** on the right in FIG. **11** into the lower edge **98** of the cap **36**. Analogously with the spiral surface **56**, here again one has a spiral surface **99**. On the inner surface **100** of the cap top, extending downwards according to FIG. **11**, a collar **101** is coaxially provided which with a snap connection holds a sealing plate **102**, the elastic outer edge **103** of which presses on the upper side **53**, in the closed condition.

According to FIG. **11** a circular-cylindrical, coaxial groove **107** is provided in the circular-cylindrical external circumference **104** far downwards, so that only a narrow wall **106** remains. The height of this groove is substantially greater than its depth. The wall **106** merges into two stop noses **108**, **109** which, regarded absolutely and in relation to one another, have the angle position visible from FIG. **13**. On their sides facing one another and lying downward according to FIG. **13** these have radial stop faces **111**, **112**. They protrude according to FIG. **12** so far that they can butt on the wall **61**. In the fully closed condition the stop face **111** strikes according to FIG. **12** from above against the wall **61** and in the fully opened condition the stop face **112** strikes from beneath against the wall **61**. They cannot stike upon the wall **62**, because this recedes further, as shown by FIG. **12**.

The external circumference **104** merges by way of a 25° slope **113**, which is likewise coaxial, into a substantially plane upper side **114**. Into this a shallow groove **116** is let which has a flat groove bottom **117** and groove side walls **118**, **119** perpendicular thereto. The central plane **121** of the groove **116**, and thus the groove itself, lies so that it is aligned with the central plane **47** of the can when the cap **36** is in its closed position or in its open position not yet pivoted up. The groove side walls **118**, **119** have the recesses **122** visible from FIG. **12**, in each case four in number, lying opposite to one another by pairs, so that mutually aligned protruding partial zones **123**, **124**, **126**, **127**, **128**, **129** remain which lie opposite to one another by pairs and are aligned in the longitudinal direction in groups of three **123**, **124**, **126**; **127**, **128**, **129**. Quarter-cylindrical beads **131**, **131** having an aligned through-passing bore are provided perpendicularly of the central plane **121** where the partial zones **124**, **128** are situated. Beneath this through-passing bore **131**, in the projection according to FIG. **11**, the groove bottom **117** has a depression **132**. An axially immovable spindle (not shown), which traverses the groove **116**, is fitted in the through-passing bore **131**.

According to FIGS. **5** and **6** the retaining ring **33** has an approximately annular configuration. It is so high that it fits in height into the groove **107** with slight play and it is so thin that it does not protrude from the groove **107**. It has a distinct I-section. Its size is such that even when the distance piece **34** is fitted the cap **36** can be rotated in relation to the retaining ring **33**. As FIG. **6** shows, the retaining ring has a uniform annular course except for about 10° and in the 10° zone has in each case a channel-shaped cranked-ff portion **132**, **133** amounting to about 180°, which is just as wide as the rest of the retaining ring **33**. The cranked portions **132**, **133** each have externally a channel face **134**, **136**, which are accordingly semi-circular. At their right end zone in FIG. **6** the cranked portions **132**, **133** merge into two lugs **137**, **138** which are plane walls parallel with one another, lie parallel to the central plane **47**, and have a lower edge **139**, which is the continuation of the lower edge of the strip **141**, the upper edge **142** of which is likewise - in the view in FIG. **5**—the continuation of the upper edge of the strip **141**, but after a short distance merges in each case into a straight slope **143**, **144**, which according to FIG. **5** drops away down to the right and by way of a somewhat downwardly protruding half-radius **146**, **147** merges again into the lower edge **139**. Reference is made expressly to FIGS. **5** and **6** regarding the precise form.

On their outwardly directed faces the half-radii **146**, **147** merge into circular discs **148**, **149** which are about **4** mm. in height. As part of the whole the disc **149** is intended in FIG. **11**, so that from its position it is possible to deduce the position of the whole. In the finally assembled condition the discs **148**, **149** lie in the milled recesses **182** of the walls **61**, **62**.

The distance piece **34** according to FIGS. **7** to **10** prevents the lugs **137**, **138** from opening out or being pressed together and renders it possible for the cap **36** to be opened fully for example according to FIG. **18** and also to be held according to FIG. **17** so that it does not drop into the pouring jet of the liquid from the can, that is it is not necessary to hold it fast separately.

The distance piece **34** is in one piece and injection-moulded from synthetic plastics material. It is symmetrical in relation to the central plane **47**. It has a back plate **150** consisting of a narrow, plane, rectangular

surface **151** with an inclined surface **152**, and thus becomes ever thinner to the right in FIG. **7**. The under side **153** is plane. In the view in FIG. **9** two pins **154, 156** issue upwards from its left corners, which have on the sides facing one another a semi-cylindrical surface **157, 158** each and are so arranged and shaped that the pin **154** in the fitted condition lies in the channel face **134** and the pin **156** lies in the channel face **136** and thus opening out is prevented. Inwardly and upwardly arranged slopes **159, 161** facilitate fitting on to the lugs **137, 138** in the appropriate regions. According to FIG. **9** a block **162** issues upwards from the upper side **153**, of which block the side faces **163, 164**, extending parallel to the central plane **47**, abut on the inner side of the lugs **137, 138** and prevent these from coming too close to one another, which would involve the danger of the discs **148, 149** coming out of the recesses **82**. Perpendicularly of the central plane **47** the block **162** has an incision **166** going to about mid height, which also divides it according to FIG. **7** in width. A U-shaped recess **167** also reaches as far as this incision **166** and together with the incision has the effect that two legs **168, 169** are produced which are springable towards one another but quite stiff. As shown especially by FIG. **7** these legs **168, 169** are somewhat longer than the remainder of the block **162**, and there they carry outwardly extending barbs **171, 172** which according to FIG. **10** carry introduction ramps at top left and top right. The effective horizontal face of the barbs **171, 172** is so arranged that when the barbs just engage beneath the lower edge **139**, the under side **153**—in so far as its partial zones come into question for this purpose—lies on the upper edge **142**. Thus the distance piece **34** can be fitted when the discs **148, 149** are lying in the recesses **82**. Then in the position according to FIG. **6** the distance piece **34** is simply pushed on from above and then it lies on the upper edge **142**, so far as the latter extends horizontally.

According to FIG. **8**, to the left of the surface **151** a transverse locking member **173** is provided the left edge **174** of which in radius manner follows the external contour of the strip **141**. The transverse locking member **173** protrudes according to FIG. **8** a little beyond the plane, mutually parallel side faces **176, 177**, and there has the form of a projection **178, 179** which in the fitted condition and in the appropriate open position reaches into that aperture which is determined by the straight edge **73**, the corner **74** and the stop edge **76**. The projections **178, 179** are in alignment, to the left according to FIG. **7**, with the edges there of the pins **154, 156**. To the right according to FIG. **7** they are about half as wide and downward they have a doming **181**. As FIG. **17** shows, the cap **36** does not tilt downwards, because the domings **181** rest on the straight edge **73** of each wall **61, 62** and at the same time the discs **148, 149** are situated in the round inlet **84** and then, on account of the tongue situated between it and the round inlet **83**, cannot pass into the round inlet **83**.

In the fully opened condition, that is for example with the can standing perpendicularly, the discs **148, 149** lie in the respective round inlet **83** and now according to FIG. **18** each projection **178, 179** lies on the pertinent stop edge **76** and thus cannot open further.

The handle **37** as explained precisely in FIGS. **14** to **16** is injection-moulded from synthetic plastics material. It has a handle web **183** and a handle grip **185**. Continuing in outline the elevation on the upper side **114** and the depression **132** the handle web **183** has a cylinder **184** on its lower end according to FIG. **14**. The through-passing bore **186** thereof is aligned with the through-passing bore **131** and is traversed by the spindle (not shown). The end faces **187, 188** of the cylinder **184** lie against the partial zones **124, 128** and thus receive guidance.

According to whether the handle **37** is hinged in the one or the other direction, the edges **189, 191** of the handle web **183** are in abutment in the partial zones **123, 127**; **126, 129**, as shown for example by FIG. **16**. The under side, visible in FIG. **14**, of the handle web **183** is the under side in the closed condition according to FIG. **19**, and is ribbed to save weight. The handle web **183** extends for example according to FIG. **19** a distance beyond the 25° slope **113** and then merges with an angle **192** of 25° into the handle grip **185**. Its upper side **193** lies in the upper side **23** in the closed condition. Laterally the handle grip **185** protrudes beyond the edges **189, 191** and has three recesses **194, 196, 197**, from beneath. The recesses **194, 197** here lie so that (FIG. **19**) they receive the upper part in FIG. **2** of the walls **61, 62**. The walls **199, 201**, since they likewise have a perpendicular course, here lie on the inner surfaces of the walls **61, 62**. For arresting, the walls **61, 62** inwardly and upwardly have two nipples **202** directed towards one another, which can engage in depressions **203** of the webs formed by the recesses **194, 196, 197**. So that the depressions **203** can be produced easily, a bore **204** is provided in alignment with them in the outer webs.

If from the initial position according to FIG. **19** it is intended to open the fitted and closed stopper, then the engagement by the nipples **202** and the depression **203** is overcome, the handle **37** is hinged down through 180° until it again lies in the groove **116**, and now the handle **37** is rotated until the stop face **112** abuts on the wall **62**. Then the cap **36** can be raised and brought for example into the positions as shown in FIG. **17** or FIG. **18**. Closing proceeds in the exactly converse manner.

What is claimed is:

1. Screw stopper for synthetic plastic cans in the range of 10 liters and above, comprising:

a pouring spout which is rigidly connected with said synthetic plastic can,

said pouring spout having a geometric longitudinal axis, an external threading, and an end face with an annular seal thereon,

a cap for said pouring spout, which is rotatable between a closed position and an open position,

said cap having an external circumference and an internal threading fitting said external threading on said pouring spout,

a projecting device projecting from said external circumference of said cap for manual transmission of a torque,

a connectin device between said pouring spout and said cap, which makes said cap non-loseable and permits rotation of said cap in relation to said pouring spout, and

the improvement wherein:

(a) said external threading is provided in three or more sectors in relation to said geometrical longitudinal axis of said pouring spout,

(b) said internal threading is provided in three or more sectors in relation to said geometrical longitudinal axis of said pouring spout, with said internal threading sectors fitting in circumferential angle into said external threading sectors and vice versa,

(c) said internal and external threadings have equal pitch, which pitch is high enough that rotation of

said cap through 180 degrees plus/minus 30 derees rotates said cap from said closed position to said open position and vice versa,

(d) said cap has an upper side and said projecting device comprises a handle on said upper side of said cap, said handle being provided with a handle grip that protrudes far beyond said external circumference of said cap and a handle web with an end region pivotably articulated with said cap,

(e) said connection device includes a retaining ring which guides said cap in a shape-engaging manner and a guide device that is rigidly connected with said pouring spout and guides said retaining ring substantially nonrotatably in relation to said geometrical longitudinal axis, and

(f) said guide device has a partial region arranged as an arrestor for said handle grip in said closed position of said cap.

2. Screw stopper according to claim **1**, wherein three sectors of said external threading and said internal threading are provided, and rotation of said cap through 180 degrees rotates said cap between said closed and open positions.

3. Screw stopper according to claim **1**, wherein said sectors of said external threading are of equal length and arranged at angularly regular intervals.

4. Screw stopper according to claim **2**, wherein said sectors are longer than 45 degrees and shorter than 60 degrees.

5. Screw stopper according to claim **1**, wherein said can has a spout extension integral with said can, and said external threading is part of an annular, injection-molded body which firmly and rigidly-abuttingly girdles said spout extension.

6. Screw stopper according to claim **1**, wherein said cap is injection-molded from synthetic plastic.

7. Screw stopper according to claim **1**, wherein said connection device is injection-molded from synthetic plastic.

8. Screw stopper according to claim **1**, wherein said handle web has a width of at least one fifth of the external diameter of said cap.

9. Screw stopper according to claim **1**, wherein said handle web has a width 3.5 plus/minus 15% smaller than the external diameter of said cap.

10. Screw stopper according to claim **1**, wherein said handle web is flat in relation to its width.

11. Screw stopper according to claim **1**, wherein said cap has a transverse axis and said handle web has a free end zone that is pivotable through 180 degrees about said transverse axis.

12. Screw stopper according to claim **11**, wherein perpendicularly of said transverse axis, said upper side of said cap has a shallow groove that accommodates said handle web in width and height.

13. Screw stopper according to claim **12**, wherein said handle web has side faces and said groove has side walls, and, at least in partial zones, said side faces of said handle web rest on said side walls of said groove.

14. Screw stopper according to claim **1**, wherein said can has carrying handles with upper sides and said handle grip has an upper side that, in a closed condition, lies at the level of said upper sides of said carrying handles and is angled in relation to said handle web.

15. Screw stopper according to claim **1**, wherein said handle grip has a hollow portion on its under side, which engages said partial region of said guide device.

16. Screw stopper according to claim **15**, wherein said partial region of said guide device is also a security means against rotation for said handle grip.

17. Screw stopper according to claim **1**, wherein when said guide device has webs, and when said handle grip is arrested by said guide device, it sits against said webs.

18. Screw stopper according to claim **1**, wherein said retaining ring has a shank zone, and said guide device comprises two mutually parallel, mutually spaced, walls parallel to said geometrical longitudinal axis of said pouring spout, said walls having interior machined depressions that guide said shank zone between them.

19. Screw stopper according to claim **18**, wherein said shank zone comprises two lugs bent out of said retaining ring and guided on said parallel walls of said guide device.

20. Screw stopper according to claim **19**, wherein a distance piece is provided which provides a spacing member for said lugs and grasps around said lugs.

21. Screw stopper according to claim **1**, wherein said retaining ring has a flat profile in cross-section and is circular-cylindrical, and said external circumference of said cap has a matching groove in which said retaining ring is guided.

22. Screw stopper according to claim **1**, wherein on said external circumference of said cap, at least one projection is provided which abuts said guide device in said closed position and/or said open position.

23. Screw stopper according to claim **22**, wherein said projection is provided beneath said retaining ring.

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